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EDITORIAL

Existing Structures: Assessment and Retrofitting

The increased urbanization and advancements coupled with the recent economic crisis have influenced the purchasing power of people, and therefore, the construction of new buildings is, nowadays, not the norm. In addition, the building stock is exposed to synergistic threats such as earthquakes, natural ageing, material deterioration, poor workmanship and supervision during construction, climate change, pollution, etc. Further, environmental changes, security risks and even human negligence affect these structures, potentially exposing them to large structural damages and loss. Considering that a great number of the existing buildings have reached or are approaching the maturity of their design life, a major concern relates to their structural integrity; therefore, ensuring their safety is of utmost importance.

Within this context, this thematic issue addresses such issues as:

[1] The assessment of the structural integrity of existing structures,
[2] Structural response and (re)design,

The articles in this thematic issue address the aforementioned issues and cover works concerning reinforced concrete and masonry structures as well as a timber roof and a case study. The conclusions of all the papers are very interesting and can be used as a reference for the researchers in the broader area of retrofitting of structures. A brief description of each of the articles is presented below:

The article "Seismic Behaviour of Masonry Buildings after Interventions of the Load Bearing System" describes the use of finite elements to investigate the response of unreinforced masonry (URM) structures with alterations in the original load bearing system, to strong ground motions. The paper presents the importance of the connection of the floor to the URM walls in the perimeter of the structure which creates a diaphragmatic action that effectively reduces the out-of-plane bending of the perimeter URM walls without excessive local stress intensities, and increases the shear strength of the building.

Recent studies conclude that the contribution of the infill walls to the overall lateral stiffness of frames is significant. The target of the study presented in the paper "The Contribution of the Infill Walls to the Lateral Resistance of Concrete Frames" is to compare various methods for the simulation of the infill walls with the finite element method and propose an alternative approach that utilizes a rigid end offset which is an option available to finite element software. The study shows that utilizing this option results in lateral stiffening of the overall frame providing an equivalent stiffness to account for the presence of the infill walls.

The article "Design provisions for an easy intervention in the future life of a structure. The case of the post- byzantine timber-roofed basilicas of Troodos area, Cyprus" deals with the timber-roofed basilicas of the Troodos mountains range in Cyprus. A unique constructional feature of these basilicas is the existence of two distinctive, but cooperating, parts of the timber roof. The basilicas' construction system is mainly characterized by the ability to confront successfully the dynamic loads of an earthquake. The design concept of the roofs was observed to incorporate a remarkable provision for an easy repair intervention and retrofitting at a later stage during their life which proves to be valuable even today and can easily be adopted when designing contemporary structures with a long-term life objective.

The paper "Numerical Modelling of Masonry-infilled RC Frame" presents a numerical study of the behavior of an existing masonry-infilled RC frame. The objective was to identify suitable numerical constitutive models of each component of the structural system and create a numerical tool to represent the in-plane behaviour of the masonry infill wall by accounting the frame-infill separation. A 2-D masonry infilled RC frame model has been created in the DIANA finite element analysis software and a linear, eigenvalue and nonlinear cyclic analysis was performed. The numerical results were verified by experimental results. The actual frame was subjected to in-plane cyclic loading through displacement control analysis.

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